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Dated 12 August 2003



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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

A10695GB-DJL/scf

2. Patent application number

(The Patent Office will fill in this part)

0219448.8

21 AUG 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Honeywell Normalair-Garrett (Holdings) Limited
Yeovil
Somerset
BA20 2YD

Patents ADP number *(if you know it)*

7937915001

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

Valves

5. Name of your agent *(if you have one)*

Forrester Ketley & Co.

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Chamberlain House
Paradise Place
Birmingham
B3 3HP

Patents ADP number *(if you know it)*

133005

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country

Priority application number
*(if you know it)*Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
*(day / month / year)*8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

Yes

- a) *any applicant named in part 3 is not an inventor, or*
- b) *there is an inventor who is not named as an applicant, or*
- c) *any named applicant is a corporate body.*

See note (d))

Patents Form 1/77

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Continuation sheets of this form

Description 6

Claim(s) 3 DM

Abstract 1

Drawing(s) 1+1

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10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination
(*Patents Form 10/77*)

Any other documents
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature Forrester Ketley s/o Date
20 August 2002

Forrester Ketley & Co.

12. Name and daytime telephone number of person to contact in the United Kingdom

D J Lucking
0121 236 0484

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PATENTS ACT 1977

A10695GB/DJL

Title: Valves

Description of Invention

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This invention relates to a valve and more particularly to a temperature sensitive valve.

The invention has particularly been developed for use in environments where the valve may be subjected to mechanical shocks such that a valve member of the valve needs to be positively retained in an operating position so as to avoid unintentional valve member movement at least from the operating condition at temperatures below a threshold temperature at which the valve member is required to move from the operating condition.

According to a first aspect of the invention we provide a temperature sensitive valve including a body affording a passageway for fluid, a valve member which is moveable relative to the body between first and second positions to control the flow of fluid through the passageway, a retaining member movable with the valve member and being engageable with a holding device to retain the valve member in the first position whilst the temperature is below a threshold value, and there being a release actuator movable when the temperature is at the threshold value to disengage the retaining member and holding device, to permit the valve member to move from the first to the second position.

Thus the valve member is positively retained in the first position until the temperature reaches the threshold value at which the release actuator acts to disengage the retaining member and holding device.

The valve may be of the kind in which the valve member is pivotal about a pivot axis relative to the body from the first to the second position, e.g. where the valve member is a flap which in the first position permits the substantially

unimpeded flow of fluid through the passageway, and in the second position engages a valve seat at least substantially to close the passageway to the flow of fluid. However the invention may be applied to other kinds of valves as required.

5 Preferably, a biasing device is provided to bias the valve member towards the second position when the retaining member and holding device are disengaged. Such biasing device will also assist maintaining the valve member in the second position although this may also be assisted by fluid pressure within the valve body, exerted for example by fluid prevented from flowing
10 through the passageway by the valve member.

In one embodiment at least one of the retaining member and holding device is resiliently deformable by the release actuator to allow the retaining member and holding member to disengage at the threshold temperature. For example the holding device may be a bifurcated element and the retaining
15 member a headed pin, the head of the pin being retained between tangs of the holding element until disengaged therefrom by the action of the release actuator.

The release actuator may act to prise apart the retaining member and the holding device or may otherwise act.

20 Preferably, the release actuator includes a thermally sensitive substance such as a wax, which expands as the temperature increased towards the threshold temperature, to move a moveable part to disengage the retaining member and holding device at the threshold temperature.

Although the release actuator may be mounted on the valve member, the
25 release actuator may be otherwise mounted for example, on the body.

Embodiments of the invention will now be described with reference to the accompanying drawing which is an illustrative diagram of a valve in accordance with the invention.

Referring to the drawing a valve 10 includes a valve body 11 which affords therethrough, a passageway 12 for fluid. In this example the flow of fluid is from left to right as seen in the drawing so that the pressure of fluid tends to move a valve member 15 from a first, fully open position in which the 5 flow of fluid through the passageway is substantially unimpeded, towards a second closed position. In the drawing the valve member 15 is shown in the first position in full lines and in the second position in dotted lines.

The valve member 15 is a flap which is pivotal about a pivot axis A afforded by a shaft 16, from the first to the second position and in this example, 10 there is a coil spring 17 wound about the axis A, to bias the valve member 15 towards the second position.

The valve 10 is a temperature sensitive valve in that the valve member 15 is retained in the first position unless the temperature reaches a threshold temperature, at which the valve member 15 moves to the second position with 15 the assistance of the coil spring 17 and the fluid pressure at an inlet 19 to the passageway 12.

The valve 10 of the embodiment described and shown is suitable for use in harsh environments, where the valve 10 may be subjected to mechanical shocks. Thus the valve member 15 needs positively to be retained in the first 20 position so as not unintentionally to move to the second position.

To retain the valve member 15 in the first position a holding device 21 is provided which in this example is a bifurcated plate of resilient material such as spring steel. The valve member 15 carries a retaining member 24 which in this example is a headed pin, a head 25 of which in this example is bi-conical.

25 When the valve member 15 is in its first position, the head 25 of the retaining member 24 is engaged with the holding device 21, between the tangs thereof, with one conical surface 26, which faces the valve member 15, supported by the tangs, and a pin 28 of the retaining member 24 passing between the tangs. In another arrangement, the holding device 21 need not be

bifurcated, but a head 25 of the retaining member 24 may be supported otherwise by a holding device 21 positively to retain the valve member 15 in the first position.

The valve member 15 carries a release actuator 30 which in this example 5 is a so-called wax-stat, which includes wax or another temperature sensitive material which expands with temperature increase, the wax or other material being contained in a reservoir 31. As the wax expands with increasing temperature, the wax acts on a moveable part 32 to extend the moveable part. The release actuator 30 is calibrated so that as temperature increases the 10 moveable part 32 acts on the holding device 31 to disengage the retaining member 24 and holding device 21, the moveable part 32 acting to prise the holding device 21 and flap valve member 15 apart.

Because of the resilience of the holding device 21, or at least of the tangs thereof, and the conical surface 26 of the underside of the head 25, the tangs are 15 movable to permit the head 25 to be disengaged from the tangs by the action of the release actuator 30. Release is arranged to occur at a threshold temperature.

When the head 25 and tangs of the holding device 21 are disengaged, the flap valve member 15 may move to the second position, into engagement with a valve seat 35 to close the valve 10 and prevent the further flow of fluid through 20 the passageway 12. The spring 17 and pressure of fluid at the inlet 19 acting to retain the valve member 15 in its closed second position.

The valve member 15 may remain in the closed second position even though the temperature may subsequently decrease to below the threshold temperature, the valve 10 requiring a service operation to return the valve 25 member 15 to the first position. For example, the shaft 16 may be rotated by a suitable tool engaging in a formation 38 at an end of the shaft 16, to return the valve member 15 to the first position. In another embodiment, some means for automatically returning the valve member 15 to the first position when the temperature decreases may be provided.

In each case, return of the head 25 to the retained first valve member 15 position is facilitated by the conical upper surface 39 of the head 25 which assists in resiliently deforming the tangs to permit the head 25 to pass as the valve member 15 is moved back to the first position.

5 The valve 10 described and shown has been designed particularly for controlling the flow of gaseous fluids such as air. More particularly the valve 10 is intended for controlling the flow of air to or in or from an air conditioning system to prevent air flow in the event that air upstream of the valve 10 is too hot to be provided downstream. Such condition is most likely to occur in the
10 event of a malfunction of the air conditioning system such that closure of the valve 10 until a service operation is carried out would not be detrimental, and could ensure the protection of temperature sensitive equipment or of personnel downstream of the valve 10.

Various modifications may be made without departing from the scope of
15 the invention.

For example, the retaining member 24 and holding device 21 may be of other configurations to that shown, provided that the valve member 15 is positively retained in the first position as shown, below the threshold temperature. The retaining member 24 may be an integral part of the valve
20 member 15 and thus need not be carried thereby, but may otherwise be moveable with the valve member 15.

Other release actuator 30 constructions are possible, and although as described the release actuator 30 is carried by the valve member 15, the release actuator 30 may otherwise be mounted, for example on the body 11 as indicated
25 in dotted lines, at B, to act upon the holding device 21 rather than the retaining member 24, to effect prising apart of the holding device 21 and retaining member 24 at the threshold temperature. The release actuator 30, where mounted on the body 11 may act transversely to the usual fluid flow direction as indicated at B only on the holding device 21, or between the holding device

21 and valve member 15 as indicated at C, in each case to prise the holding device 21 and retaining member 24 apart at the threshold temperature.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in 5 terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A temperature sensitive valve including a body affording a passageway for fluid, a valve member which is moveable relative to the body between first and second positions to control the flow of fluid through the passageway, a retaining member movable with the valve member and being engageable with a holding device to retain the valve member in the first position whilst the temperature is below a threshold value, and there being a release actuator movable when the temperature is at the threshold value to disengage the retaining member and holding device, to permit the valve member to move from the first to the second position.
10
2. A valve according to claim 1 wherein the valve member is pivotal about a pivot axis relative to the body from the first to the second position.
15
3. A valve according to claim 2 wherein the valve member is a flap which in the first position permits the substantially unimpeded flow of fluid through the passageway, and in the second position engages a valve seat at least substantially to close the passageway to the flow of fluid.
20
4. A valve according to any one of the preceding claims wherein a biasing device is provided to bias the valve member towards the second position when the retaining member and holding device are disengaged.
- 25 5. A valve according to any one of the preceding claims wherein once the valve member has moved to the second position, the valve member remains in the second position even in the event that the temperature falls below the threshold value.

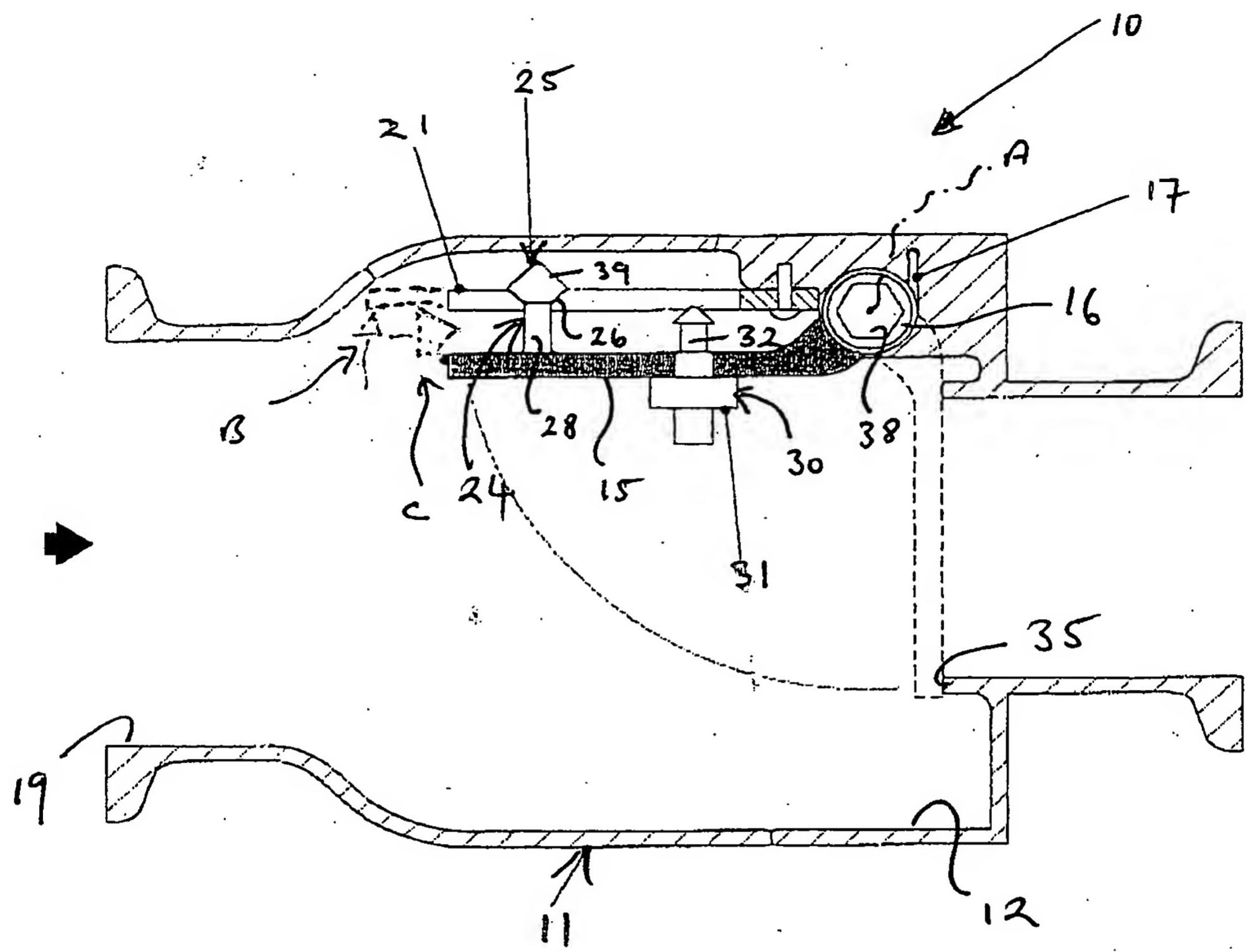
6. A valve according to any one of the preceding claims wherein at least one of the retaining member and holding device is resiliently deformable by the release actuator to allow the retaining member and holding member to
5 disengage at the threshold temperature.
7. A valve according to claim 5 wherein the holding device is a bifurcated element and the retaining member is a headed pin, the head of the pin being retained between the tangs of the holding element until disengaged therefrom
10 by the action of the release actuator.
8. A valve according to claim 5 or claim 6 wherein the release actuator acts to prise apart the retaining member and the holding device.
- 15 9. A valve according to any one of the preceding claims wherein the release actuator includes a thermally sensitive substance which expands as the temperature increased towards the threshold temperature, to move a moveable part to disengage the retaining member and holding device at the threshold temperature.
20
10. A valve according to any one of the preceding claims wherein the release actuator is mounted on the valve member.
- 25 11. A valve according to any one of claims 1 to 8 wherein the release actuator is mounted on the body.
12. A valve substantially as hereinbefore described with reference to and/or as shown in the accompanying drawing.

13. Any novel feature or novel combination of features shown herein and/or as described with reference to the accompanying drawings.

ABSTRACT

Title: Valves

5 A temperature sensitive valve 10 includes a body 11 affording a passageway 12 for fluid, a valve member 15 which is moveable relative to the body 12 between first and second positions to control the flow of fluid through the passageway 12, a retaining member 24 movable with the valve member 15 and being engageable with a holding device 21 to retain the valve member 15 in
10 the first position whilst the temperature is below a threshold value, and there being a release actuator 30 movable when the temperature is at the threshold value to disengage the retaining member 24 and holding device 21, to permit the valve member 15 to move from the first to the second position.



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